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PSYCHOLOGY AND SCIENTIFIC METHODS

PROFESSOR DEWEY'S ANALYSIS OF THOUGHT

THE most serious charge at present brought against pragmatism is that of infertility, of incapacity to provide the basis for a systematic reconstruction of the philosophical disciplines. Pragmatists, says Professor Hoernlé, have made fewer contributions of weight to any recognized branch of philosophy than the members of any other school. Since the considerations fundamental to pragmatism are drawn from logic, from a statement of the position and function of thought in experience, the present absence of a pragmatic logic, a systematic working-out of the pragmatic method in the way that Bosanquet, for example, has worked out the method of idealism, is regarded as a fact of sinister significance for the movement. The nearest approach to such a coherent treatment of the parts of logic, as distinguished from polemics, or statements of general principles, is to be found in Professor Dewey's *How We Think*. It is the purpose of the present paper to criticize certain points in the treatment therein contained, to show, if possible, instances of defective analysis, misplacings of distinctions, which render unnecessarily difficult a reorganization of the material of traditional logic from the instrumental viewpoint. I have tried not to overlook the fact that the book is less a systematic treatise, even on a small scale, than a practical study of the means of making thought more effective, less liable to error. Nevertheless, there is a specifically logical portion, and this appears to contain errors the effect of which is to introduce incoherence, an unnecessarily fragmentary character, into the treatment, and to make it in one or two respects definitely misleading.

In Part II. of the work in question, entitled "Logical Considerations," there is an analysis of the stages or elements present in every complete act of thought. These are found to be (1) the occurrence of a difficulty, (2) its accurate specification, (3) suggestion of a solution, (4) expansion of the suggestion, and finally (5) experimental testing. The third step, the step of passing from the known to the unknown, is identified with the operation traditionally familiar as induction. The fourth, that of developing the implications

of a suggestion, is similarly identified with what is traditionally known as deduction. I shall try to show that these identifications can be made only at the expense of giving to both induction and deduction an interpretation that distorts their true character, or, rather, that loses no inconsiderable part of the significance contained in or at least foreshadowed by the accounts of them that have been given in the historical development of logic.

The first point in the analysis with which it seems possible to find fault is the identification of induction with suggestion or the emergence of an hypothesis. We are supposed to begin with isolated details, and go from them to a general law or connection by which they are unified; the terms between which the inductive relation holds are regarded as temporally antecedent and subsequent. Such a view, though in accordance with the meaning given by Mill to induction, seems to be at variance with other statements of Dewey's general position, and to contain various objectionable features. Thought is elsewhere in Dewey's works spoken of as a constant reorganization of experience, as a passage not from isolated data to coherent ideas, but from a relatively incoherent and inaccurate unification of data to a redetermination in which the character of both is reciprocally modified. It seems inconsistent, therefore, to attribute to particulars even a momentary temporal priority as against universals. Recent discussions of induction, furthermore, have made it abundantly clear that no such temporal sequence is necessarily involved in it; the relationship of which the norm is more or less accurately defined in Mill's canons may be regarded not as one between events, but as between any abstractly formulated law or connection and the particular facts adequate to establish it. So regarded, this relationship may be briefly formulated as follows: any suggested law or abstract connection, which may be symbolized $s-p$, is true if (1) the conjunction of its terms is positively embodied in fact, *i.e.*, if the concrete $s-p$ is observed, and (2) all alternative causes of p are excluded by their failure to occur in the presence of p , or by their presence in the absence of p .

The advantages of treating induction as a matter of disqualification of competing hypotheses are too lengthy to be given in full here, but attention may at least be called to the service of such a treatment in unifying the interpretation of induction. The establishment of laws upon facts is universally regarded as increasingly valid in proportion as the Method of Difference is substituted for the Method of Agreement, *i.e.*, as enumeration of cases passes into experiment. But the facts secured as a result of experiment come to light *after* the hypothesis is formed, since it is only in the light of a suggested

explanation that the conditions of experiment can be arranged. Hence at least a part, and that the logically more important part, of the data which the general idea unifies, and which together form one term of the inductive relationship, are temporally subsequent to the idea, and can not be its cause or generating antecedent. The importance of experiment and its logical function are of course not only admitted but emphasized in *How We Think*; what seems to have been overlooked is their significance with reference to the classification of induction. When "scientific induction" is defined as "all the processes by which the observing and amassing of data are regulated with a view to facilitating the formation of explanatory conceptions and theories," accuracy seems to require that for the words "facilitating the formation," the expression "determining the acceptance" be substituted.

Another reason for objecting to the identification of hypothesizing and induction is that the former seems at least equally deductive in character. The definitions of deduction are numerous, but they always involve the application of knowledge, of ideas, already in hand. The assimilation of a particular case to a familiar rule is the typical illustration of the first figure of the syllogism. Obviously, any hypothesis from which this assimilative character, this aspect of subsumption, is *totally* absent can only be a guess, in the most derogatory sense of the word, a suggestion in behalf of which no presumption of relevance or adequacy can be offered. Only if we already have some information about a problematic situation, some experience of analogous situations, are we able to form a conjecture not entirely random. A hypothesis from which the deductive aspect was totally excluded would correspond to a situation absolutely unfamiliar, and this, as Professor Dewey repeatedly asserts, is the limiting case in which thought ceases to be possible. Apparently, therefore, both the nature of induction and the nature of suggestion make impossible any simple equation of the two.

To say this is not, of course, to deny that the facts given at the start of an inquiry are in some degree related to what they suggest as inductive premises to inductive conclusion. It is, however, to deny that the suggestive rôle of the facts is what gives them their inductive character, and the meaning of the denial may perhaps best be illustrated by the statement that the inductive relationship is much more in evidence between the hypothesis and its final verification, between the hypothesis and the experimentally discovered facts that determine whether it is to be accepted or rejected.

An analogous criticism may be made of the equation between expansion of a suggestion and deduction. If it is true that the act of

conjecture contains a deductive element, the consequence is clear that deduction can not be confined to such expansion. Furthermore, the meaning which deduction has acquired in recent developments of logic (*cf.* Royce's article on "Logic" in the *Encyclopedia of the Philosophical Sciences*, Vol. I.) is that of a general theory of types of order, or implication, and the development of the content of a hypothesis, while it of course follows or makes use of such types of order, can not, since it is partial or selective, be identified with them. This selectiveness is insisted upon by all writers of the pragmatic school; thought is said to pick out the features or implications of a hypothesis which are relevant to the question at issue.

The practical bearing of the foregoing contentions may be illustrated by a reference to at least one of the consequences attendant upon rigid separation of the stages of thought, and, as it seems, misinterpretation of them. The last stage, Professor Dewey says, that of experiment, validates or invalidates the whole operation: induction yields the hypothesis, deduction amplifies it and gives it the form required for submission to the issue of experiment, and finally that issue fixes its status as truth or error. This criterion, that of practical success, has been criticized as involving the "fallacy of the consequent"; the pragmatist has been said to argue from "if *a* is true, *b* is true," and "*b* is true," to "*a* is true." The inference holds, it is said, only if *a* is the sole possible antecedent of *b*; a hypothesis must not only fit the facts, it must be the only hypothesis to fit the facts. To this Professor Moore replies in *Creative Intelligence* with the rejoinder that the assumption of a plurality of hypotheses applicable to a given set of facts is the essence of skepticism, and that, therefore, if an hypothesis meets all the facts in question, it is the true explanation of them. Such a postulate can be true, however, only in a final unification of knowledge. Short of that, it is undeniable that we may be confronted with a situation for which there are alternative explanations between which we are without the means to decide.

An answer of more immediate relevance seems therefore to be required. Such is to be found, if I am not mistaken, in a reference to the context in which pragmatism places reflection, the context of doubt or conflict. The hypothesis that is formed under conditions of conflict is formed always as an alternative to some other already in the field, and experimental testing, to be relevant to the issue, must be found in the exhibition of some facts decisive between the rival alternatives. Conflict, in other words, directs experiment to crucial cases, such that the positive corroboration of one hypothesis is also a negation of the alternative. But the conditions under which such

confirmation is negative as well as positive are precisely those distinctive of Mill's Method of Difference or Joint Method, as against the Method of Agreement and ultimately Induction by Simple Enumeration. The analysis offered by Mill and other writers on induction is thus available, with modifications in perspective, for defining the conditions of conclusiveness in experimental verification. If, however, degrees of adequacy in induction are treated as marking differences in the facts out of which suggestion springs, the logician is left with no means, or at least no principle, for the evaluation of experimental results. Thus the pragmatic logician, by limiting too narrowly the scope of induction, deprives himself of the authority of the inductive canons at the moment he is most in need of it. In practical terms, he seems to have no reply in principle, in any dispute, to whoever may say "I told you so," no matter how irrelevant to the issue may be the favorable result offered as confirmation.

The conclusion to which the foregoing criticism seems to point the way is that neither induction nor deduction can be isolated as a distinct step or process of thought. In the third at least of Professor Dewey's five steps, both are present simultaneously. This conclusion, if true, suggests the more general possibility that the reflective act as a whole is one, that the stages noted are not temporally distinct divisions of thinking, but that, as thinking becomes "reasoning," in the eulogistic sense of the word, at least the second, third, and fourth of them tend to fuse into one indivisible act. Such a consideration may seem psychological, as distinct from logical; this distinction, however, is scarcely one which a pragmatist is at liberty to urge as a ground for refusing to pursue the discussion. Nor is it possible to deny that attention to the features distinguishing "genius" from mere readiness to take pains can have practical import. Even if it is true that in this sense we can not by taking thought add a cubit to our intellectual stature, we may be saved from faith in a kind of intellectual democracy to which Professor Dewey's treatment, perhaps only through misunderstanding, might lead the unwary.

To such a consideration, Professor Dewey himself points the way. In *How We Think*, Ch. III., under the caption "dimensions of suggestions," ease, variety, and depth are given as the aspects of suggestion, the qualities with reference to which suggestion may vary. If "reasoning" be understood in the sense just indicated, to indicate reflection at its highest pitch of effectiveness, the contention seems not unreasonable that it is no other than suggestion characterized by such "profundity"; and conversely, that if the quality in question is to be defined in a manner other than metaphorical, the traits dis-

tinguished in the logical analysis of reasoning are those that must be included in the definition.

To be more explicit: not all suggestion in the presence of a difficulty constitutes reasoning. We may think of possible solutions that are seen on a moment's consideration to be irrelevant to the conditions of the problem, *i.e.*, suggestions evoked by only a part of the problematic situation. In proportion as the situation as a whole is effective in controlling suggestion, a correspondingly large part of the comparison of tentative conjectures with the conditions to be met becomes unnecessary, for these conditions operate in advance to call out only suggestions that are relevant, and at least to that extent adequate. Given the same problem, and an approximately equal equipment, in the way of information and general ideas, one of two men may find illumination at once, while the other may grope about trying one hypothesis after another which would either be dismissed at once by the first as patently ineligible, or never occur to him at all. The difference, in other words, between the penetrating and the obtuse mind—in James's terminology, between the minds characterized respectively by association by similarity and association by contiguity—is a difference between a focusing upon the case in question of all the funded results of the agent's past experience, the occurrence of analogies at once subtle and to the point, and as contrasted with this, a disposition to entertain possibilities that are trite or irrelevant. If this is so, if reflection becomes reasoning, in the distinctive and eulogistic sense of the word, in proportion as suggestion represents the maximum use of the intellectual resources potentially available, the deductive character of suggestion becomes increasingly apparent.

From this point of view, then, the act of suggestion is one in which a given case is thought of as possibly analogous to some previously experienced situation, as perhaps coming under the condition of some already established (or at least assumed) law of which the relevance to it was not immediately obvious. It remains to be shown wherein the act contains also an inductive element. The simple identification of suggestion and induction in the manner indicated in *How We Think* has been rejected, but if the essential unity of the act of thought is to be maintained, the inductive aspect of suggestion must be made clear. This seems to be possible if we consider induction as a matter of exclusion, of gradual elimination, from a supposed cause, of all circumstances not genuinely essential to the effect. Assuming such an interpretation, I shall try to show how hypothecation involves the elements indicated as characteristic of induction, exhibits the expulsion from an implicative antecedent of

everything not proved germane to the consequent. The suggestion by which a conflict is solved, to repeat the burden of the foregoing paragraph, is always an attempt to extend to a problematic case some more or less vaguely conceived law, or to bring the datum in line with some other case in which the connection of content is perhaps not clearly analyzed out. Given the problem, the essential intellectual difficulty is always that of finding the analogy, the relevant law; and the mark of superior intelligence is ability to penetrate disguises, to see beneath variations in detail an essential identity. This penetration, this perception of the same amidst difference, is inductive in that it frees the essential element in the familiar law, the analogous instance, from the adventitious circumstances in which it was embedded, and which obscured its applicability to the situation in question. That the law as finally applied and *pro tanto* verified did contain at the start an impure nexus, a connection vitiated by irrelevancies, is apparent from the fact that the conflict occurred. Had its area of applicability been demarcated with perfect clearness, the problem would either never have arisen, or have been solved as soon as perceived.

An illustration may serve to clarify the point. The proverbial case of such penetrative insight is the reputed suggestion to Newton of the law of gravitation by a falling apple. The inductive aspect of this hypothesis appears, if what has gone before is true, in that the element of movement toward the earth in a straight line is excluded from the concept of gravitational acceleration: the new facts to which the concept is extended admit the extension only on condition that the concept be redefined or remoulded, that elements in it previously considered essential be dropped or reinterpreted. The hypothesis must, of course, be tested by appeal to fact, and my contention is not, therefore, that the inductive relation or operation is complete with the emergence of the hypothesis but that the hypothesis does contain an inductive aspect; furthermore, that the inductive aspect appears, not, as Professor Dewey asserts, in that there is a passage from particulars to a universal, but in that a universal already in existence is more accurately defined and delimited by its application to a new particular.

If it is admitted that the elements essential to reflection are, or may be, both contained in the act of hypothecation, what remains to be shown is that the other steps into which Professor Dewey analyzes thought are not really independent operations at all. The first, the occurrence of a difficulty, the emergence of conflict, is not of course regarded as a part of reflection, but only as its occasion. The second, the definition or location of the difficulty, clearly involves the whole

process in itself. In proportion as the difficulty of finding what is the difficulty increases, the total operation of suggestion, elucidation of meaning, and ultimate testing has to be gone through with in detail: alternative diagnoses have to be thought of, developed into their implications, and referred to the conditions that are not doubtful. It is a cycle within a cycle, not an irreducible element in a single act. Of the fourth operation, we may say that it is not a fixed quantity, but in proportion as the reflective agent is acute or intelligent, the implications of his suggestion are in a corresponding degree apparent to him at once, and the explicit process of deduction of consequences need not be gone through with; or, where the consequences are too extended or too unfamiliar to be grasped in a single flash of insight, the work of bringing them into clear consciousness either repeats the whole operation, or else is a mere matter of calculation, something which could conceivably be turned over to an adding-machine. Either the implications are unfamiliar, and must be unrolled tentatively, with constant reference to the conditions to be met; or they are familiar, a matter of routine, and their explication is the work of habit or mechanism. Of this step again it seems to be true that it is either a cycle in a larger cycle, involving all the phases of thought, or that it is present in a degree inversely proportionate to the agent's acuteness, profundity, breadth of grasp.

There remains only the fifth stage, that of experimental testing. I have no intention of controverting the statement that this is essential if the process of reflection is to be complete. It is certainly not, however, a separate stage in the sense of being an independent variable; the question it answers is laid down by the preceding "mental" processes, the appreciation of the problem plus the suggested hypothesis. It exhibits also the same variations correlated with variations in degree of intelligence as do the previous stages; the better the quality of the antecedent reflection the less the experimentation required to establish the conclusion. In proportion as an hypothesis really meets the conditions of a problem the experiment is directed with increasing accuracy to crucial instances. If it is true that no real issue can be settled without actual trial, it is no less true that the mark of high ability is economical, *i.e.*, relevant, testing. Of this final stage, too, the form taken in any given problem is fixed, at least in general outlines, the moment the hypothesis has taken shape.

To the contention for the unity of the whole reflective process I believe Professor Dewey would assent, though for the purpose of his book, which is to fix attention on the points at which error is probable and control possible, the distinctness of the stages of reflection is doubtless more important than their unity. And in general it will,

I hope, be apparent that the purpose of this discussion has not been to take issue with Professor Dewey's view of the nature of thought and its function in experience. Rather, I have tried to point out minor points of detail in which, perhaps only through misplaced emphasis, the treatment of reflection in *How We Think* presents a systematic restatement of prior logical analyses which seem to belong in any working-out of the subject. Or, from another point of view, my purpose has been to indicate possible modifications in Professor Dewey's account of thought that may promote a more fruitful interaction of psychology and logic. I have tried to suggest, *e.g.*, in "direction of experiment to crucial instances," an objective form of definition for what he calls "profundity" or "depth" in conjecture. Or, more generally, to indicate, however inadequately, a method of transforming the results of logic into a shape relevant to the purposes of psychological investigation, and *vice versa*. It is no unimportant part of the instrumentalist contention that psychology and logic are essentially related, and that progress in either one depends upon progress in the other. All the more important is it that no view, no analysis, should be accepted in either field that may block the traffic between them.

LAURENCE BUERMAYER.

PRINCETON, N. J.

THE METAPHYSICAL MONIST AS A SOCIOLOGICAL PLURALIST¹

THE main purpose of this brief paper is to stress the fact that one may hold the numerically monistic conception of the universe as Absolute, and even as Absolute Self or Person, without thereby committing oneself to the conception of the social group as literally a person or self, a "being with a mind of its own."² There is, to be sure, a sense in which the conception of the social group as a self may be said to be facilitated by the Absolute-Self-doctrine. For if the universe is rightly conceived as One Self, including all the unnumbered lesser selves of the universe, there is apparent reason for describing races, societies, communities each as a sort of intermediate self of many interrelated persons. (The conception of a self as including selves is familiar to us not merely through the accumulating accounts of "subconscious" and "co-conscious" selves, but through the facts of the moral experience, the battling of "lower" against "higher" self, for example.) So far, however, the argument for

¹ A paper read at the meeting of the American Philosophical Association in Ithaca, December, 1919.

² Royce, *The Problem of Christianity*, Vol. I., p. 63.